

# Sébastien Blaise

Geophysical flows modeling, Numerical analysis and Software development

## contact

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## languages

french: mother tongue  
english: fluent  
spanish: good

## education and experience

- 2016-now **Senior Project Engineer** Fugro Geoconsulting, BE  
*Numerical simulation for geotechnical consultancy*
- Participation in the development and use of numerical models for offshore sediment flows (debris flow, turbidity current)
  - Preparation of consultancy studies on geohazard risk assessment
  - Development of pipeline route optimization routines
  - Lead developer of a flow assurance numerical model to simulate flows in pipelines
- 2012-2015 **Postdoctoral researcher** Université catholique de Louvain, BE  
Project head: *Multiscale atmospheric modeling of extreme events*
- Developed and applied numerical methods for simulating efficiently atmospheric phenomena covering a wide range of scales.
  - Simulated tropical cyclones generation and propagation.
  - Developed visualization tools for atmospheric simulation results
- Hex-dominant mesh generation and computation*
- Contributed to the generation of computing meshes composed of a majority of hexahedra, an industry standard.
  - Designed simulation techniques for such nonconforming meshes.
- 09-12 2011 **University lecturer** Université Bordeaux 1, FR  
Taught to master students in applied mathematics.
- 2009-2011 **Postdoctoral fellow** National Center for Atmospheric Research, USA  
*Dynamic adaptation and discrete adjoint for tsunami simulations.*
- Designed and implemented dynamic mesh and order adaptation techniques for efficient simulations of free-surface flows.
  - Developed a tsunami warning system based on adjoint data reconstruction using real-time measurements.
- 2005-2009 **PhD in Applied Sciences** Université catholique de Louvain, BE  
*Development of a finite element marine model.*
- Designed and implemented efficient numerical tools for three-dimensional marine simulations on distributed computers.
  - Performed simulation-based studies on realistic marine domains (Great Barrier Reef, Mururoa Atoll Lagoon, Scheldt Estuary).
  - Developed innovative techniques to compute diagnostic variables used to interpret easily the output of complex numerical models.
- Doctoral courses attended:
- *High Performance Computing for Engineering* (Pécs, HU).
  - *Sun Application Tuning Seminar* (Namur, BE).
- 2000-2005 **Master in Civil Engineering** Université catholique de Louvain, BE  
Specialization: *Geotechnics, Construction.*  
*Exchange student at the Universitat Politècnica de Catalunya, SP.*

## computing skills

**Experience:** 10 years as a main developer of 3 large C++ codes. Work on high-performance computing for large parallel computers (MPI, OpenMP). Development of a high-order visualization tool now used by the industry.

**Numerical methods:** Numerical solution of ordinary and partial differential equations. Excellent knowledge of the discontinuous Galerkin method. Good knowledge of (extended) finite element, finite volume and finite difference methods. Discrete adjoint method for optimization problems. Dynamic *hp*-adaptation method. Efficient time-integration methods. Mesh generation.

**Development tools:** Version control and build systems. Debugging and profiling tools. Automatic validation.

**Languages:** C, C++, Python, Java, Fortran, Matlab, HTML, PHP.

**Other:** Office tools, Linux (use/administration), LaTeX.

## academic activities

**Author** of **14** publications in international peer-reviewed journals.

**Speaker** for **14** presentations at international conferences and author of **6** posters.

**Invited** (funded by host) for **7** international research stays and conferences.

**Proposal evaluation panels:** Member of a *US National Science foundation (NSF)* proposal review panel (grants from **300,000\$** to **3,000,000\$**). Referee for proposals submitted to the *Mardsen Fund* from the *Royal Society of New Zealand* (grants from **300,000\$** to **800,000\$**).

**Journal reviewer** for **8** different international journals.

Member of the **Consortium for Mathematics in the Geosciences (CMG++)**.

**Courses taught:** introduction to mechanics (substitute), resolution of sparse linear systems, introduction to Fortran 90 and data structures.

**Supervised exercises and labs** for engineering students (introduction to finite element methods, introduction to mechanics, resolution of partial differential equations, project of structure, physics).

## awards and fellowships

2006-2009	<b>Doctoral Fellowship</b>	National Fund for Research in Industry and Agriculture, BE
2009-2011	<b>Postdoctoral Fellowship</b>	NSF/NCAR Advanced Study Program, USA
2011	<b>Travel Award</b>	Society for Industrial and Applied Mathematics
	SIAM Conference on Computational Science and Engineering	
	<b>1065\$ award</b> (free 515\$ registration plus 550\$)	